it will be an admirable companion, and even the resident of many years' standing cannot fail to find explanation of much that he has not understood before, and have his attention directed to many things which he had previously failed to notice.

PLAGUE IN ENGLAND.[1]

THE recent appearance of plague in East Suffolk forms the subject of some valuable reports and papers recently issued by the medical department of the Local Government Board. The reports are divided into three sections, each of which deals with the plague from different aspects. The first section contains the late Dr. Bulstrode's "report upon the occurrence, in the autumn of 1910, of four deaths at Freston, near Ipswich, from a rapidly fatal and infectious malady diagnosed as pneumonic plague, and upon the prevalence of plague in rodents in Suffolk and Essex." It also includes his report upon two localised outbreaks of disease in East Suffolk in 1909–10 and 1906–7, which may have been instances of bubonic and pneumonic plague respectively." The second section records the results of an inquiry by Drs. Martin and Roland, in the months of November and December, 1910, into rat plague in East Anglia, with special reference to the fleas infesting rodents; and the third section gives a report by Drs. Petrie and Macalister "upon the examination of rats collected in Suffolk and Essex for plague-infection between January 16 and February 14, 1911."

The information in the volume, though not sufficient to fix the exact origin of the Freston outbreak, cr the avenues by which the other two outbreaks spread, is nevertheless very complete so far as the facts could be traced. The great loss which the medical department of the Local Government Board has sustained by the death of Dr. Bulstrode is impressed upon one when perusing his able report on the investigations which he made on the plague. Like all his former work, it is characterised by care, thoroughness, and good judgment.

It appears that between September 16 and September 29 there occurred in a four-roomed cottage in Freston three deaths. Daughter, mother, and father in a family of six succumbed to an obscure lung affection after a few days' illness. In a cottage a quarter of a mile away there also died on September 29 a woman with the same symptoms. She had nursed the mother, and had evidently caught the infection from her. The main features of the illness were the obscurity of the lung symptoms, the dark-stained expectoration, the high temperature, the great prostration, and the rapidly fatal issue in about three days without any corresponding serious physical signs to account for it. In three out of the four cases vomiting and purging were present. The anomalous character of the symptoms, the nature of which puzzled the medical men attending the cases, led to a bacteriological examination being made by Dr. Heath, the honorary bacteriologist to the Ipswich and East Suffolk Hospital, who found in the specimens and cultures a bacillus corresponding in its reaction and appearance with those of the plague bacillus. The illness was then recognised as pneumonic plague, which is well known for its infectivity and fatality.

No direct evidence could be obtained as to the manner in which the daughter, a child of seven years of age, who was first attacked, had become infected, but the inquiry as to the source of infection led to the important discovery that an epizootic affecting rats and hares was prevailing in the district. Bacteriological examination of a number of rats, hares, a cat, and a ferret showed them to be plague-infected, and accordingly afforded opportunities for human infection. There was evidence also that the epizootic among rats extended so far back as 1906. In that year a large number of dead rats had been observed at Shottley and its neighbourhood, about four miles distant from Freston. It was here that a sudden and fatal illness had occurred in December, 1906, in a poor family, and had extended to those who nursed the sick. Eight persons were attacked with what appeared at the time to be a virulent form of influenza, and six of these died after three to four days' illness.

Another outbreak of a puzzling character occurred in December, 1909, and January, 1910, at Frimley, on the north bank of the Orwell, and almost opposite Shottley. It was in a two-roomed cottage occupied by a family of seven in poor circumstances. The whole of the family was successively attacked by an illness unfamiliar to the medical men, and in some cases associated with glandular enlargements. Four of the family died and three recovered. One of the family went to stay with a friend for a few days, and subsequently the child of the friend was fatally attacked with similar symptoms. Dr. Bulstrode concludes from his investigation of the Frimley outbreak that, "although there are, from lack of full information, many lacunæ in the story, the balance of evidence certainly seems in favour of a view that the malady was bubonic and septicæmic plague."

It is an instructive story, and shows that in England as in other countries plague can be overlooked both in human beings and in the lower animals. It is evident that the infection of plague has existed in this part of the country for the past four years, introduced probably by infected rats in grain ships arriving from infected ports.

Drs. Petrie and Macalister's work is valuable in demonstrating that out of 6071 rats examined from the districts immediately surrounding those proved to be infected, all were of the *Mus decumanus* variety, and none were found to be infected with plague. It is to be hoped that the Government will continue this good work in the autumn and in the coming years, for it by no means follows that the rat plague-infections which, as has been shown by Drs. Martin and Roland, occur in pockets, have been all discovered, even with this large number of examinations.

The investigations of Drs. Martin and Roland have demonstrated some interesting facts relative to the rat-flea population. It appears that the rat-flea of India, *Xenopsylla cheopis,* could not be found on any of the rats examined; that more than 50 per cent. of the rat-fleas in East Suffolk consisted of the *Ctenophthalmus agyrtes*, which evidently does not bite men, and that the remainder of the rat-flea population is composed of *Ceratophyllus fasciatus*, which bites man, but not so readily as does *Xenopsylla cheopis*. These facts are cheering so far as they go, as it is estimated that on an average there is less than half a man-biting flea for a rat. It would be reassuring if it were proved that the flea was the only method by which human plague spreads, and if the history of the three outbreaks pointed in that direction. Unfortunately, two of them appear to have been of the pneumonic variety, and the third septicæmic and bubonic in character. The evidence so far scarcely lends itself to the view that the comparative freedom of the rat from man-biting fleas will secure safety from plague in England. Dr. Newsholme recognises the dangers from this aspect of the question, and the warning given by him and the late Dr. Bulstrode as to the necessity for vigilance is timely and none too strong. The

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[1] Reports and Papers on Suspected Cases of Human Plague in East Suffolk and on an Epizootic of Plague in Rodents. Reports to the Local Government Board on Public Health and Medical Subjects. New Series, No. 52. (1911.)

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optimism which leads to the relaxation of sustained effort in dealing with a plague epizootic is most dangerous.

The one important fact is that the plague-infection has gained a lodgment in this country after an absence of nearly 250 years, and the only safe course to be pursued is to prevent the rat-infection from becoming endemic. Nothing is to be gathered from the fact that only a few human cases have occurred in four years in a sparsely populated locality. This is the ordinary behaviour of plague in new localities in this pandemic. Because no human epidemic happens quickly the impression is produced that the country is immune. In London in the seventeenth century there were in seventy years only four severe epidemics, and for fifteen years before the great plague of London in 1665 there was only on an average fourteen plague deaths per year in the metropolis. It is well not to place too much reliance on the different conditions existing in the seventeenth century and now. In the former period the general sanitary conditions were undoubtedly much worse than they are at present, but we have the very poor, and more of them, still with us in our slums, and they still live in an overcrowded state, with none too much light or sanitation in their houses.

W. J. SIMPSON.

THE NUTRITIVE VALUE OF BREAD.[1]

DR. HAMILL has presented an admirable report, free in every way from prejudice, which will long serve as an authoritative statement on the somewhat vexed question of the nutritive value of bread. The account summarises the scientific and technical information at present available, and clearly indicates the complexity of the problem. Previous writers on this subject, when not biassed by commercial considerations, have as a rule dealt with the question from a restricted point of view, but this report in no way suffers in this respect.

The first section deals with the classes of wheat flour, and Dr. Hamill is careful to define the technical terms used, which are usually grossly misused by popular writers on the subject. The contention that nutritive flour cannot be made in roller mills is once for all disposed of, and the advocates of the stone mill are reminded that the hard foreign wheats with brittle skins, such as form the great bulk of the wheat grown in western America, cannot be satisfactorily milled between stones. A very much greater degree of separation can be obtained in the more complicated process of roller milling, and there is no reason for a return to stone mills even if this were possible economically. With regard to colour, patent grade flours, which are the whitest, have better baking qualities than households, and therefore command a higher price—the report, however, overlooks the fact that the colour of bread depends more on the "strength" of the flour used than on its colour in the dry state.

The second section, which is supplemented by much valuable tabular matter, summarises all that is known as to the nutritive value deduced from chemical analysis of various milling products and bread made from them. Much of the experimental work quoted has been done by the United States Department of Agriculture. It is to be hoped that now that this question has received so much notice in this country, the Local Government Board will itself initiate experimental work on some of the lines indicated by Dr. Hamill; indeed, the report contains analyses of various milling products made by Dr. Monier-Williams in the Local Government Board laboratories. Valuable as these are, it is now necessary to go somewhat deeper into the matter than the simple determination of elemental composition.

In a valuable section headed physiological considerations, it is shown that many of the opinions so confidently expressed in public by such bodies as the Bread Reform League are certainly untenable, whilst upon other points our knowledge is still too uncertain to enable a definite statement to be made. Highly erroneous is the notion that high-grade white patent flour is practically devoid of nitrogenous constituents—actually the very opposite is the case, and, other things being equal, a diet which consists wholly of bread would possess greater advantages in this respect when made from strong wheats. The degree to which bread is acted upon by the digestive juices, and the extent to which the products of digestion are absorbed and assimilated, are problems requiring further investigation, and although much has already been done this only serves to indicate the complexity of the subject and to show how many factors must be taken into account. The evidence available is given in full in the report.

Much has been written about the digestibility of bran. Results are quoted which indicate that the presence of branny particles, even when very finely divided, affects the digestibility of bread. It was found by Goodfellow, for example, that when milk is taken with wholemeal bread 3 per cent. less milk was digested than when the milk was taken alone. It is probable for this reason that the large class of wholemeal breads, sold to the public at an enhanced price, are inferior to white bread excepting when they are taken for definite medicinal reasons.

Regarding the whole question from a common-sense point of view, it is a fact that the differences in nutritive value between various grades of flour made from the same wheat are insignificant when compared with the differences between flours made from different wheats. So long as Britain derives its flour from all over the world this last question is the paramount one. The big millers are so skilful in blending wheats that the flour supply of the large towns is practically uniform in quality throughout the year.

The questions of germ and mineral requirements are fully discussed, and it is admitted that the knowledge of the latter point is still very imperfect. Here, however, Dr. Hamill ventures to draw a conclusion which will be disputed by many, namely, that to ensure as large a supply of minerals as possible it is advisable to substitute very finely ground entire wheat bread for a portion of the white bread in the diet of growing children.

He qualifies this subsequently by admitting that when bread is supplemented by other foods, such as are present in an ordinary mixed diet, the advantage which one kind of bread may possess over another becomes negligible. Many children whose food consists largely of bread do not get enough of it, and are underfed in respect of all the essential nutritive substances. It is better in such cases to increase the amount of bread taken rather than to substitute another form of bread, and still better to supplement the bread by other materials such as milk, which contains a substantial quantity of the nutritive materials lacking in bread. The effect of bread on the teeth is fully discussed: the differences between different kinds of bread in this respect would appear to be negligible. This again is a direct contradiction of recent assertions.

The preparation and properties of the so-called standard flour and bread are described at some length,

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[1] Dr. J. M. Hamill's Report to the Local Government Board on the Nutritive Value of Bread made from Different Varieties of Wheat Flour. Pp. 53. (Published by H.M. Stationery Office.) [Cd. 5831.] Price 3*d*.

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